

REMARKS

Claims 1-4, 22-26 are currently pending in the application. Claim 1 has been amended for clarification. Claims 23 and 25 have been added with support on page 5, lines 22-28 and page 6, lines 1-3 of the application. Claims 24 and 26 have been added and have similar subject matter to that of claim 1.

REMARKS REGARDING **ALAGY**:

Claims 1-4, and 22 stand rejected under 35 USC §103(a) as being unpatentable over **Alagy et al.**, US Patent No. 4,780,196, (“**Algay**”).

The Examiner alleges that **Alagy** discloses an apparatus comprising a metallic tube bundle reactor/heat exchanger which has parallel through-channels in the form of tubes, surrounded by a shell through which a heating or cooling medium can be conducted. The Examiner alleges that one of ordinary skill in the art would use 10, 100, 1000, or 10,000 tubes as needed.

The Examiner has further alleged that the material worked upon does not limit an apparatus claim, and therefore the heterogeneous catalyst within the channels do not further limit the apparatus claim.

The Applicants respectfully traverse the Examiner’s rejection. According to §103, in order to establish a prima facie case of obviousness, there must be (1) some suggestion or motivation to modify the references, (2) reasonable expectation of success and (3) the prior art reference must teach or suggest all of the claim limitations. See MPEP §2143.

Applicants respectfully assert that MPEP §2115 is directed toward the occurrence where an object is merely worked upon by the invention and contributes nothing more. In the claims at hand, the catalysts and/or precursors are explicitly part of the apparatus. The claim is explicit that what is claimed is a combined system of a tube-bundle reactor or heat exchanger and at least ten different heterogeneous catalysts and/or their precursors is claimed, wherein the different heterogeneous catalysts and/or their precursors are contained in different through-channels.

In fact, as stated, the claim is directed to “an array of heterogeneous catalysts and/or their precursors.” The claim sets out what the array of heterogeneous catalysts and/or their precursors is comprised of. Applicants respectfully submit that the Examiner should not exclude what the claim, by its own terms and preamble, is explicitly directed to. Applicants respectfully assert that because the claim is directed to an array of heterogeneous catalysts and/or their precursors, such catalysts and/or precursors cannot then be merely a thing worked upon, but are an intricate part of the claimed system.

Applicants have added new claim 24, which is an array of heterogenous catalysts and/or their precursors “comprising n different heterogeneous catalysts and/or their precursors...” Such claim is explicit and clear that the heterogeneous catalysts and/or their precursors are part of the claimed system of the combination of catalyst and tube bundle reactor or heat exchanger and not merely something worked upon.

The array according to the present invention contains at least ten different catalysts in ten different tubes. The multi-channel system according to **Alagy**, however, does not contain different catalysts in different tubes. Thus, there is a basic difference between **Alagy** and the present invention as claimed. The array according to the present invention allows for testing numerous catalysts with low expenditure and under conditions which resemble an industrial process. See Application, page 3, line 33 to page 4, line 2 of the specification. The present invention makes it possible to test several different catalysts in one single reactor at the same time in order to evaluate the catalysts. **Alagy** does not disclose nor suggest such a system for parallel reactions on different heterogeneous catalysts. Thus, the Applicants hold the view that **Alagy** does not render the present claims prima facie obvious.

Furthermore, the Examiner alleges that even though the heat exchange medium of **Alagy** flows through tubes, that these tubes are within a shell and therefore meet the limitations of the claims.

According to **Alagy**, the reaction channels through which the charge to be processed passes are represented by rows of channels (D). See **Alagy**, column 8, lines 40-45. The channels through which the heat exchange fluid passes are represented by hatched rows of channels (F). See id.

However, Applicants respectfully assert that **Alagy** does not disclose a shell through which a heating or cooling medium can be conducted according to the claims. In **Alagy**, the heat exchange medium flows through tubes (F) which are in contact with the tubes containing the reaction medium. Even if it is granted that **Alagy** discloses a shell, it is explicit that no medium is conducted through the shell itself. Even if tubes are surrounded by a shell, such does not mean that the medium is therefore conducted through the shell. Instead, the medium is conducted through the tubes (F). As is recited in claim 1, the heat exchange medium flows through the shell and not through the tubes or part of the tubes.

Claim 23 adds further clarification that the heating or cooling medium can flow through the entire shell and around the tubes and provide heating or cooling to the tubes uniformly. See Application, page 5, lines 22-28. As stated in the application on page 5, lines 27-28, the “heating or cooling medium can be conducted through the shell.” This portion is explicit that the cooling medium can flow through the shell, and flow around the tubes so that “all of the tubes can be heated or cooled uniformly.” Furthermore, as indicated on page 6, lines 1-2, in tube bundle-reactors or heat exchangers, there is a space in the body between the channels.

Applicants have also added new claim 26 which recites a metallic tube-bundle reactor or heat exchanger consisting essentially of parallel through-channels...surrounded by a shell...and...n channels. Such use of “consisting of” excludes additional tubes for heat exchange medium in the tube bundle reactor or heat exchanger. See MPEP §2111.03. Therefore, **Alagy** does not disclose or suggest the claimed invention.

The Examiner has further alleged that the claim only specifically recites that the heat exchanger must be metallic. Applicants respectfully assert that “metallic” applies to both the tube-bundle reactor and heat exchanger. In order to clarify this, Applicants have amended the claim to include “metallic” before “heat exchanger.”

The Examiner also additionally alleges that **Alagy** discloses the ceramic multi channel system can be cordierite, and that cordierite comprises iron and therefore is metallic. Applicants respectfully assert that this material is a mixed oxide of magnesium, aluminum, silicon, and sometimes iron. Applicants have enclosed a copy of a German

chemical dictionary. The formula for cordierite is as follows: $\text{Mg}_2\text{Al}_3[\text{AlSi}_5\text{O}_{18}]$.

Therefore, Cordierite is a mixed metal oxide. A mixed metal oxide is not “metallic.”

Thus Applicants respectfully assert that **Alagy** does not disclose the claimed invention because **Alagy** does not disclose a metallic tube bundle reactor or a metallic heat exchanger according to the claims.

REMARKS REGARDING PRIMACK:

Claims 1-4 and 22 also stand rejected under 35 USC §103(a) as being unpatentable over **Primack et al.**, US Patent No. 5,087,784 (“**Primack**”). Applicants respectfully traverse this rejection.

The Examiner alleges that **Primack** discloses parallel through-channels in the form of tubes (30), surrounded by a shell (4) through which a heating or cooling medium can be conducted. The Examiner alleges that it would have been obvious to one of ordinary skill in the art to use any number of tubes (30).

Applicants respectfully assert that **Primack** does not disclose or suggest the limitations of the claimed invention.

Primack relates to an aromatic alkylation process and apparatus. As is evident from the figure provided in the reference, the tubes running through the vessel have holes (32) leading to a mass exchange and contact between the tubes and the surrounding shell. According to **Primack**, a catalyst slurry is prepared in a tank (62) which is located on top of the reactor. From this tank the catalyst slurry flows through the tubes (30) and is recovered in a second tank (74). In order to let a chemical reaction take place in the reactor, the tubes (30) contain holes through which reaction gases pass. Thus, the medium inside the tubes is in contact with the shell around the tubes. Therefore, the distillation zone (21) cannot conduct a heat exchange medium according to the claimed invention because through the openings (32) in the permeable tubes (30), any heat exchange medium in the distillation zone (21) would enter the tubes. See **Primack** column 7, lines 32-35. This does not disclose the claimed invention.

Furthermore, according to **Primack**, no different catalysts are contained in different tubes of the reactor since all tubes are fed from one single catalyst slurry tank

(62). Thus **Primack** does not disclose or render the present invention as now claimed prima facie obvious.

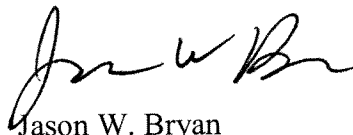
None of the cited references disclose or suggest a tube-bundle reactor or heat exchanger in which the tubes are filled with different catalyst and in which the tubes are surrounded by a heat exchanging medium. Thus the cited references do not render the claimed invention obvious.

REQUEST FOR EXTENSION OF TIME:

It is respectfully requested that a one month extension of time be granted in this case. The respective \$120.00 fee is paid by credit card (Form PTO-2038 enclosed).

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees, to Deposit Account No. 14.1437. Please credit any excess fees to such deposit account.

Respectfully submitted,
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